Citizens' Bulletin

Volume 10 Number 6 February 1983 $5/yr.
The Connecticut Department of Environmental Protection

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Volume 10 Number 6 $5/yr.
Cover Photo: Rhododendron maximum; Leslie J. Mehrhoff

Contents

DEP Citizens' Bulletin
(USPS 041-570)

Published eleven times a year by the Department of Environmental Protection. Yearly subscription $5.00; two years, $9.00. 2nd class postage paid at Hartford, Connecticut. Funds are also provided through a federal grant from the Office of Coastal Zone Management under the Coastal Zone Management Act of 1972. Please forward any address change immediately.

Everybody out!

The Connecticut Department of Environmental Protection's Information and Education Section is conducting a new series of outdoor discovery events at several sites throughout Connecticut.

These Family Outdoor Discovery Programs are designed for the general public, especially children and their parents in family groups. The topics include outdoor activities, environmental concerns, and specific projects undertaken by the D.E.P. Programs will be presented by department personnel and selected guest speakers. Most of the programs will feature hands-on activities for participants. They are all designed to get people out to enjoy State Parks, Forests, and natural preserves on a year-round basis.

A schedule follows. For more details on any of the programs or the series, call 566-8108 Monday through Friday, 8:30 a.m.-4:30 p.m.

February 12, 1983
Art of Fishing through the Ice
10 a.m.-12 noon
First Bolton Lake, Bolton
Rain date: Feb. 13; 1-3 p.m.

March 12, 1983
Maple Sugaring
10 a.m.-12 noon
Devil's Hopyard State Park, East Haddam
Rain Date: March 13, 1-3 p.m.

April 23, 1983
Signs of Spring
10 a.m.-12 noon
Devil's Hopyard State Park, East Haddam
Rain date: April 24, 1-3 p.m.

May 21, 1983
Overnight Outdoor Family Experience (primitive camping)
Goodwin State Forest, East Hampton
Meet between 10 a.m. and noon
Registration required.
No rain date.

June 18, 1983
Reading the Landscape
10 a.m.-12 noon
Ragged Hill Woods Student Environmental Center, Abington
Rain date: June 19, 1-3 p.m.

June 25, 1983
Aquatic Life Study
10 a.m.-12 noon
Hopeville Pond State Park, Griswold
Rain date: June 26, 1-3 p.m.

July 16, 1983
Salt Marsh Walk
10 a.m.-12 noon
Barn Island Preserve, Stonington
Rain date: July 17, 1-3 p.m.

July 30, 1983
Connecticut Shoreline Natural History Walk
10 a.m.-12 noon
Bluff Point State Park, Groton
Rain date: July 31, 1-3 p.m.

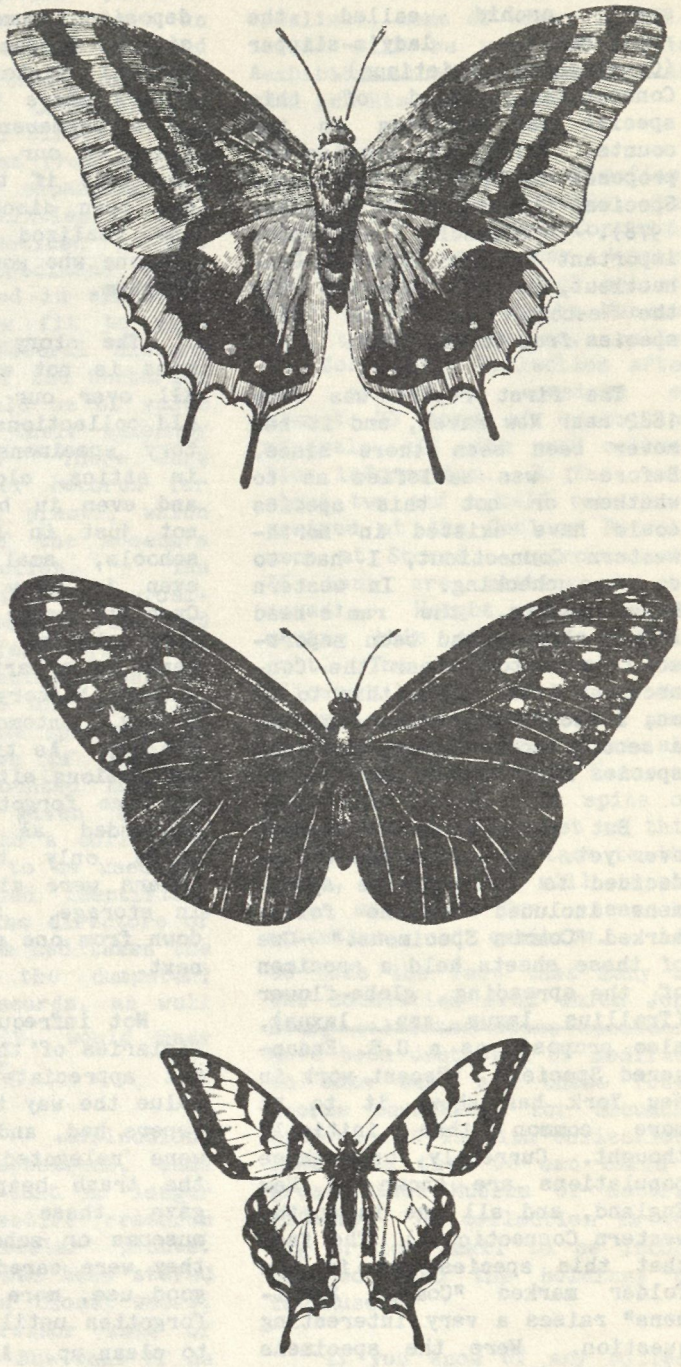
August 13, 1983
Living History Demonstration
10 a.m.-12 noon
Gay City State Park, Hebron
Rain date: August 14, 1-3 p.m.

August 27, 1983
Motor Tour to Significant Habitats in Western Connecticut
10 a.m-2 p.m.
White Memorial Conservation Center, Litchfield
No rain date

September 24, 1983
Overnight Outdoor Family Experience (primitive camping)
Goodwin State Forest, East Hampton
Meet between 10 a.m. and noon.
Registration required.
No rain date.

October 22, 1983
Talcott Mountain Ridge Natural History Walk
10 a.m.-3 p.m.
Talcott Mountain State Park, Avon.
Rain date: Oct. 23, 1-3 p.m. ■

"The Connecticut Department of Environmental Protection is an equal opportunity agency that provides services, facilities and employment opportunities without regard to race, color, religion, age, sex, physical handicap, national origin, ancestry, marital status or political beliefs."



Spare those specimens!

Museum covets old collections

By Leslie J. Mehrhoff, DEP Natural Resources Center

Who would ever think that a drawer in a third floor reading room of a small northwestern Connecticut town's library could hold exciting treasures for a naturalist studying rare plants? H. Lincoln Foster, a botanist and friend who knows of my interest in rare species, found some old specimens in the library in Falls Village and alerted me to his "find." I went to Falls Village to see them as soon as I could.

It seems that C. Belle Maltbie, librarian around the turn of the century at the D. M. Hunt Library, had made a small collection of pressed specimens of local plants. On those with a date, the year was always the same: 1895. Some specimens only had the name of the species on the sheet; these were of little value in trying to determine old localities for these species.

Others were marked with not only the date but also the name of a local landmark by which localities could be determined. Unfortunately, usually only a town name was given and nothing more. Maltbie had placed these specimens, almost 35 sheets of them (24 sheets with collection information), in two folders, and that is how they were when Linc Foster found them.

One of the folders was marked "Common Specimens" and the other had the enticing words, "Orchids and Rare Specimens." This was the folder to which I was instantly drawn. Part of my job with the State Department of Environmental Protection's Connecticut Geological & Natural History Survey is to document historic records for rare species of flora and fauna. In this folder we found a specimen of American ginseng (Panax quinquefolius) and a showy lady's-slipper (Cypripedium reginae), both with names of the places from which the specimens had come.

But the most exciting find was a small plant in the corner of one sheet that had three different species on it. This

interesting specimen was a small orchid called the ram's-head lady's-slipper (Cypripedium arietinum). A Connecticut record of this species was exciting on two counts. First, the species was proposed as a U.S. Threatened Species (Ayensu & DePhillips, 1978). Secondly, and more important for our work in Connecticut, is that this was only the second report of this species from Connecticut.

The first report was from 1882 near New Haven, and it has never been seen there since. Before I was satisfied as to whether or not this species could have existed in northwestern Connecticut, I had to do some checking. In western Massachusetts, the ram's-head lady's-slipper had been reported from a town near the Connecticut line. With this to go on, I decided to accept this as a second "good" report for this species from Connecticut.

But the excitement wasn't over yet. Out of curiosity, we decided to look at the specimens included in the folder marked "Common Specimens." One of these sheets held a specimen of the spreading globe-flower (Trollius laxus ssp. laxus), also proposed as a U.S. Endangered Species. (Recent work in New York has shown it to be more common than initially thought. Currently, only three populations are known in New England, and all are in northwestern Connecticut.) The fact that this species was in the folder marked "Common Specimens" raises a very interesting question. Were the specimens mixed up by someone over the years, or was the spreading globe-flower really more common around the turn of the century? One can only speculate as to the answer, but at least these data give us a few more clues about places in which to look for remaining populations of this plant.

The D. M. Hunt Library realized the value of these specimens to our research on Connecticut's rare plants and gave the sheets to the Connecticut Geological and Natural History Survey, and we have deposited them in the University of Connecticut's Museum of Natural History Herbarium at Storrs where they can be part of a permanent record of the flora of our State. Think of the loss if these two folders had been discarded because no one realized that there was someone who would be interested in them.

The story of these specimens is not an isolated case. All over our State there are old collections of natural history specimens gathering dust in attics, closets, basements, and even in barns. They are not just in libraries but in schools, small museums, and even in many private homes. Over the years many collections were started by serious students of a particular aspect of natural history, be it geology, botany, entomology, or ornithology. As time passed, these collections either grew in size or were forgotten. Many were discarded as worthless junk which only took up space. Others were given away or put in storage. Some were handed down from one generation to the next.

Not infrequently, the beneficiaries of these legacies did not appreciate their research value the way that the original owners had, and the collections were relegated to storage or the trash heap. Some people gave these collections to museums or schools. Sometimes they were cared for and put to good use, more often they were forgotten until someone decided to clean up. A choice invariably came: what to do with these things, give them away or discard them. I am afraid that the second choice was more frequently opted for because no one could imagine who would want all these old things.

Museums around the world are made up of many small collections amassed under one roof (at least nominally, some larger museums have many buildings full of specimens). Some of these collections may have been the result of institutionally sponsored collecting trips to far off lands as once was the vogue. The collections may also have resulted from local research sponsored by the museum. Equally important in the make-up of a museum, however, are the small private collections which found their way, as donations, into the museum's stores of specimens.

I imagine that for as long as man has had the luxury of time to make collections of things which caught his fancy, he has probably done so. The heyday of this collection craze came during the Victorian era when it was socially acceptable for a young man to amass a small collection of natural history items. These "cabinets of curiosities," as they were occasionally known, were prominently displayed in Victorian parlors in this country and abroad. (One only has to remember many scenes from the recent motion picture version of John Fowles' "The French Lieutenant's Woman," where the protagonist, Charles Smithson, was collecting fossils, or the scene from the same movie in the doctor's office, where the viewer was treated to a panoply of vertebrate skulls).

Young ladies were not left out of this collecting mania. They, however, kept to the more delicate forms of collecting, in keeping with what Victorian times dictated for them, such as butterflies or ferns and wildflowers. Two excellent books are available on this period and its natural history. The "Heyday of Natural History" by Lynn Barber is currently available, and some libraries might have a copy of a British book entitled, "The Victorian Fern Craze, A History of Pteridomania" by David Elliston Allen.

These people approached their hobbies with zeal. Many times large cabinets were prepared for the display of their collections. A popular subject was a "natural" presentation of mounted birds. Within glass display cases artificial trees were created out of wire carefully wrapped with dried moss. These "trees" were usually liberally dosed with arsenic,

as were the mounted birds, to keep insects away. Although the birds were mounted in life-like postures, there was usually no concern for their natural habitats or geographical ranges. Passenger pigeons would be seen on the same branch with a bird of paradise from New Guinea, if one was available.

The display cases were objects of beauty to the eclectic Victorians and were frequently displayed in prominent places in hallways or drawing rooms. As time went on, the birds faded or owners tired of this sort of Omnium gatherum, and the cases would be relegated to attics or barns where they would be left to waste away.

While working for a small natural history museum a few years ago, I had the occasion to dismantle one of these private bird collections that had found its way to the attic of a palatial home in Gloucester, Massachusetts. In the case there were over a hundred birds including such specimens as sunbirds from the East Indies and hummingbirds from the Amazon Basin in Brazil, as well as many of our familiar native birds. There was also a heath hen, Tympanuchus cupido, and a beautifully mounted passenger pigeon, Ectopistes migratorius (both of these are now extinct) and a scarlet ibis, Eudocimus ruber, that had faded to a pale pink on the side facing the attic window. Along with the glass display case, there were numerous mounted waterfowl, each with locality and collection information, and a potpourri of assorted natural history specimens such as a large snapping turtle shell, a fossilized bivalve mollusc, and a dorsal scute from a sturgeon's backbone dated "26 NOV 1908." Most of the items went to the museum, where they were used in exhibits and in educational programs. Specimens with locality and collection data were made available for research.

More recently, I have on two separate occasions received specimens on behalf of the University of Connecticut's Museum of Natural History. The first instance was from another museum that was expanding its educational facilities. The directors had decided to get rid of their specimens which could not be used in exhibits. Wisely, they saw fit to give the Museum of Natural History at Storrs many of the herbarium sheets which would be of value for research on their taxonomy or distribution. There were also a number of records for Connecticut rare plants, which are now part of the museum's research collection. The museum is the official repository for the State's rare and endangered species work. At the museum, specimens can be used to document historic distribution of these species. An insect collection of approximately 11,000 mounted individuals was also given to the museum as well as a collection of wood samples to be used for teaching and wood identification. What if the directors of this small museum had taken the easy route to the dumpster? Many valuable records, as well as teaching tools, would have been lost forever.

The other collection, pressed plant specimens, came from a college that no longer maintained an active research program in vascular plants. Their specimens had been stored in a fourth floor closet where, luckily, a professor knew of their existence. But what if he had left that college and no one else knew of these old specimens or their whereabouts? It may seem like a lot of "what ifs," but if these specimens were lost or destroyed it would be a terrible waste.

The University of Connecticut is consolidating all of its natural history collections under one masthead, that of a Museum of Natural History. This will include existing collections in botany, zoology, geology, and anthropology. As the museum grows and plans are realized, some of these collections will be used as public exhibits on various aspects of Man and His Environment.

Ideally, museum collections keep growing. Recently, the widow of a well-known Connecticut mineral collector donated her late husband's rock collection to the University Museum. The total collection, called the John Henry Collection after the collector, consists of almost 20 tons of rocks and minerals, all with good collection information. So far, only about two and a half tons have arrived at the Geology Department at Storrs. Approximately 16 tons are waiting to be moved. Weight alone makes moving this collection difficult. The whole issue is complicated by the fact that Mr. Henry had moved to Georgia some years ago, and his rocks all have to be returned to Connecticut from there. In spite of the problems, a bequest of this nature is very important to the State, because it will supply much material for research, education, and exhibits. Add to this the fact that many of the localities from which John Henry collected these specimens have been destroyed or modified in some way, and these rocks become invaluable for documentation. It is with collections like this that we can build a great State Museum of Natural History. No collection is too big or too small to be incorporated into the holdings of the Museum.

If you know of any collections, or own one yourself, consider the Museum of Natural History at Storrs as a place for it. Before it gets relegated to a damp basement, or even worse, to the town landfill, contact me about making the arrangements for it to be incorporated into the museum's holdings. Somebody took the time to make the collection and to care for it, so why not see that it gets proper care at a museum, where it can also serve many important functions.

At the Museum of Natural History at Storrs it can be

To page 23

Natural Resources Center's director gets medal for "putting it all together"

Dr. Hugo F. Thomas, State Geologist and director of DEP's Natural Resources Center, received the Bronze Medal for 1982 from the Federated Garden Clubs of Connecticut, Inc. Each year, with this medal, the Federated Garden Clubs recognizes an individual or organization for contributions important to improving and maintaining the quality of life in our State.

The theme for the 1982 award was "Understanding and Growth through Communications," and it's a theme, Thomas says, that well fits his work and that of the ten-year old Natural Resources Center. This unique agency is playing an increasing part in fostering an understanding of the natural resources of Connecticut among those who manage and protect them.

The plot for success in this whole story began as a relatively standard one -- getting the person with the problem together with the person with the solution. That the two happened to be one and the same made it that much the easier.

Ten years ago, Thomas was teaching what he refers to as "traditional geology" at the University of Connecticut. He was also involved in a number of local conservation efforts -- as a member of Coventry's first town council, as chairman of the town's Conservation Commission, as a member of the Windham Regional Planning Agency's Open Space Advisory Committee, and as chairman of the Willimantic River Task Force, among others.

Working on the various committees and commissions, Thomas says, made him aware of the difficulties involved in applying scientific information in local decision-making. The

experience began changing his orientation as a geologist -- from traditional abstract research to a greater interest in applying information on natural processes, and their interrelationships, to actual problems. Initially this new interest led to Thomas's creating a new course, called "Environmental Geology," which dealt with applications such as what's involved in finding suitable sites for dumps. But it didn't stop there.

In 1968 Thomas became involved in the Connecticut Geological and Natural History Survey's ad hoc Geology-Soils Task Force. One of the important accomplishments of this task force was coming up, in 1970, with the idea for a single agency that would amass natural resource data for the State and conduct research where such data was lacking. Equally important, this agency would develop formats through which the information could be supplied in an understandable manner and used by diverse environmental decision makers at various levels of government. Essentially it was the concept for the organization that now exists as DEP's Natural Resources Center!

This idea was, as it turned out, one whose time was very soon to come. In 1971 the Department of Environmental Protection had been formed. Early in 1972, after hearing one of Thomas's talks about the need for a comprehensive resource data center, DEP's first Commissioner, Dan Lufkin, invited Thomas to discuss the idea further.

"Setting up such a center was a challenge difficult to resist," says Thomas. "When I left that meeting," he adds, "I realized I'd just made a commitment to change careers."

Today, ten years and "one big learning curve" later, Connecticut is still the only State in which data on all the natural resource systems -- land surface, earth materials, water, atmosphere, and biology -- are combined within a single office that also offers a program of outreach to every level of decision maker -- local, regional, State, and federal.

At its simplest level of activity, the Natural Resources Center will sell you a map -- topographic, geologic, soil, hydrologic. Last fiscal year it sold 8,000, as well as 2,000 bulletins on natural resource related topics. More important, from the standpoint of education and communication, its staff also provided assistance in using these materials to over 1,000 persons.

For its entire 10 years the Natural Resources Center has offered annual Land Use Workshops for Municipal Decision Makers, attracting an average of 80 persons per session. It has also offered occasional educational workshops on topics such as drought contingency planning for water suppliers and flood hazard management for municipal officials.

By State statute the Geological and Natural History Survey still exists (as it has since 1903), operating as the scientific research section of the Natural Resources Center and compiling data inventories. It is complemented by the Data Application Section, which is charged with educational programs and services as well as water resources planning, flood planning, and liaison work.

The center produces maps and publications as well as maintaining inventories of them; its activities include mapping of drainage basins, soils, and bedrock geology as well as monitoring stream flow, ground water levels, atmospheric deposition, etc. It coordinates inventories of wetlands, plant life, and animal species as well as watching over the State's water supply and the quality of its waters.

Over the past ten years the center has published some 190 bulletins ranging from "Method for Establishing the 7-day, 10-year Low Flow of Streams in Connecticut" and "Saltwater Fishes" to "Rare and Endangered Species of Connecticut and their Habitats" and "Spiders of Connecticut." Over the years some publications, like the latter, have gained national and international reputations as classics in their fields. Other topics have included geology field trips in Connecticut, water resources inventories and aquifer maps, manuals on septic systems and site plan reviews, and "What's Legally Required," a guide for making local land use decisions.

The Natural Resources Center's staff of 30 includes geologists, hydrogeologists, cartographers, statisticians, planners, research analysts, biologists, as well as specialists in soils, etc.

As its research projects suggest, today's Natural Resources Center is far more than just a big natural resource library. "We have evolved," says Thomas, "from a tremendously fragmented resource base -- the 'data dump' approach. We've brought it together so today we can better respond to the user's needs." Thomas stresses that the consumer is an important part of the center's total concept. "We found you have to understand the decision making process, and you have to put our resources into their 'frame of reference.'" He also stresses the need to think and to present information in terms of natural resource systems and to encourage the development of regulations and management schemes accordingly.

The State's new Water Quality Standards and Classifications document, whose creation the Federated Garden Clubs cited in its award to Thomas, is the most dramatic -- though it's far from the only -- example of the scope and the value of what can be done with the NRC's assistance.

The Water Quality Standards and Classifications are, says Thomas, "very comprehensive, integrating surface and ground

water management from water supply to waste disposal. Back in 1967 the Water Resources Commission had developed a model water quality classification system for surface waters. We worked together with DEP's Water Compliance Unit and used the same model for classifying ground water." He adds, "We were able to do this, in Connecticut, because we had 30 years of detailed inventories -- of the static resources, such as soils and geology -and monitoring of the dynamic resources, such as air, water, biota."

Thomas says of the Water Quality Standards and Classifications, "Now we're reaping the fruits of all our efforts in a statewide policy that we can apply in the policy planning, management, and regulatory areas."

Of Natural Resources Center activities in general, he adds, "We're oriented to total results. We try to look toward the State's needs -not just a given unit's. We don't have day-to-day responsibility for regulation. Other units have to react to crises without the luxury of looking at things in a longer-term framework. We try to look ahead in anticipation of emerging problems."

Last spring the NRC issued a manual on flood management for municipal officials. After June's floods, they augmented it with a fall flood management workshop that was attended by close to 300 local officials. Likewise, during drought periods in the summers of 1980 and 1981, the NRC added extensive involvement in emergency water supply issues to its ongoing major programs of long-term water supply management.

How much can the Natural Resources Center help, or, in other words, how much do we know? "The quality of our information," says Thomas, "is relative to the level of decision making. Our understanding of processes like water flow is good. Our knowledge is good at the level of statewide planning and policy making. For design,

for specific site problems, the data falls off. We may or may not have the information."

"We offer what we have, within DEP as well as to other organizations," says Thomas, "and we will try to produce data for their needs...we'll take on a job and try to meet the users on their terms." And the Natural Resources Center keeps anticipating: "Three to five years down the road we expect our Coastal Management programs will need more base data on the water dynamics and marine geology of Long Island Sound. Until now our inventories have been mainly terrestrial. But now we're actively involved in under-Sound mapping and geologic analyses of Long Island Sound."

"Today," says Thomas, "other units almost unconsciously come asking us about the resource -- whether it's a question of supplementary water supplies for park swimming areas or the location of a well for a new salmon facility"...or a project of the scope of the revised State Water Quality Standards and Classifications. ■

Connecticut's water standards have covered a lot of ground

Connecticut is recognized as one of the five leading states in the country in dealing with ground water issues. It is the only State of the five that is using resource conditions and basin boundary knowledge in dealing with its total water system. The following is excerpted from the testimony of Robert E. Moore, Director of DEP's Water Compliance Unit, before the Toxic Substances and Environmental Oversight Subcommittee of the U. S. Senate Committee on the Environment and Public Works and from a speech, "Defining the Basic Objectives of a Ground Water Program," given by Moore at the Sixth National Ground Water Quality Symposium, September 22, 1982.

Why worry?

Protecting Connecticut's ground waters for future water supplies and recovering or reclaiming those ground waters already lost to contamination is this State's major and most important water quality goal.

Approximately 46 percent of Connecticut's 3,100,000 people rely on ground water for their water supply. Twenty percent rely on individual household wells for drinking water, and no routine monitoring is conducted to verify the potability of these supplies. The demand for ground water is increasing as requirements for increased treatment of surface water supplies are imposed.

Seventy-eight of Connecticut's 169 towns have experienced contamination of water supplies within their boundaries during the last five years. By January 1982 over 350 wells were known to have been contaminated by a variety of pollution sources including home disposal of household chemicals and septic system additives, road salt, fuel and chemical storage, landfill leachate, and toxic and hazardous wastes.

Sixty-five of these wells were public water supplies; the remaining, private or commercial supplies. These wells

served an estimated 200,000 persons. Half of the problems have been resolved (primarily those involving public water supplies) by development of new sources or treatment. Many of the private domestic well owners are relying on bottled water, home filters, or boiling.

Our awareness of these problems increases almost daily as we monitor more and more landfill and industrial sites for ground water contamination. In my own small town of 5,000 people, during one month over 20 wells were found to be contaminated by trichloroethelene from two industrial sources.

It has been possible to carry out control and abatement of these ground water contamination problems under Connecticut's Clean Water Act of 1967. Ground and surface waters are defined as waters of the State by this act, under which, unlike the federal laws, all enforcement and permitting powers are the same.

However, until 1980 the inseparable relationship beween ground and surface water was not recognized in water quality policy, comprehensive planning, or standards for use of or discharge to ground waters. In fact, for its first decade, DEP's water quality program's efforts were oriented almost exclusively to waste water treatment as it applied to discharges to surface waters.

In September of 1980, statewide ground water quality standards and criteria were adopted, and it was determined that a system of ground water quality standards paralleling the State's surface water quality program would be workable and effective. In other words, Connecticut chose not to develop a separate or distinct ground water program but rather to integrate ground and surface water management.

Classification of ground water could not occur without defining ground water movement, or flow systems, and determining its boundaries. To do this, certain reasonable assumptions had to be made. The primary assumption was that ground water follows the same areal pattern as the surface watershed and discharges to the surface water. This assumption is valid for most of Connecticut for the shallow ground water flow system the standards address. (This program has not been applied to the deeper bedrock ground water flow systems. The assumption also may not be valid in states with differing hydrogeology.)

Understanding the resource

A basic step in developing our ground water program was a detailed evaluation of the State's hydrology, geology, and other related natural resource conditions. All surface watersheds with drainage areas greater than one square mile, depth to bedrock, till and depth of till deposits, stratified drift including thickness and grain size of deposits, and depth to water table were plotted on maps at the 1:24,000 scale.

Contours of certain combinations of this data were also mapped to define areas suitable for water supply development and those potentially suited to waste disposal to the ground. (It should be noted that the hydrogeologic data and other natural resource data would not have been available without 30 or more previous years of effort by a variety of sources including the U.S. Geological Survey and the USDA Soil Conservation Service.)

In addition, all existing and planned public surface water supply reservoirs, all existing public water supply wells, all wastewater and cooling water discharges to ground and surface waters, industrial waste lagoons, landfills, all oil and chemical spills or leaks recorded since 1976, salt piles, septage lagoons, contaminated wells, and plumes were also mapped on overlays at the same scale (i.e., 1:24,000).

The data was further compared with broad land use information, topography, natural and preservation areas, parklands, State owned fish and game preserves, trout stocked streams, and existing and potential anadromous fish runs. Other statewide conservation and development plans and policies were evaluated and appropriate data plotted.

Goals and approaches

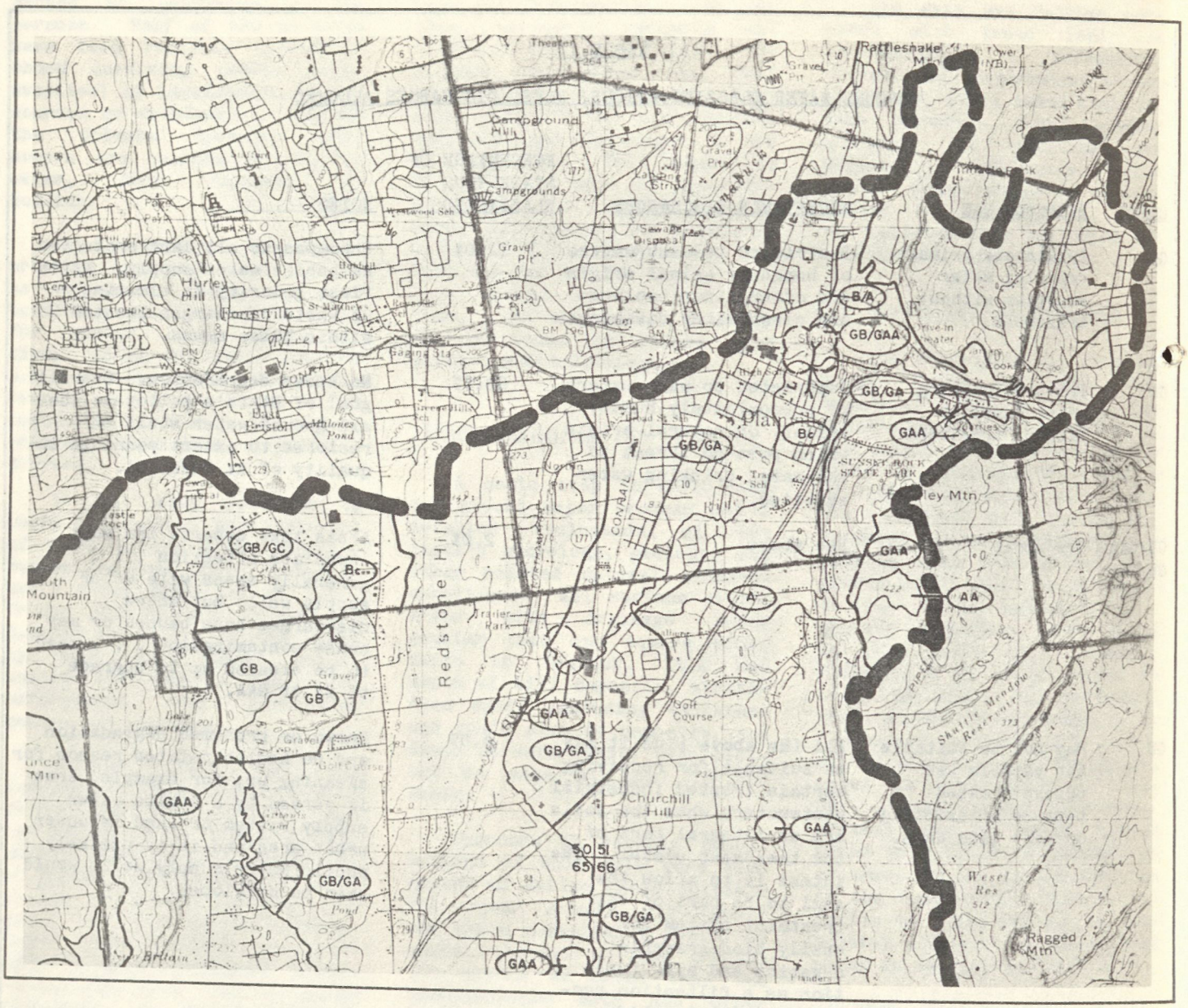
The Department of Environmental Protection adopted the following policy for the State's ground waters: "It is the policy of the State to restore or maintain the quality of the ground water to a quality consistent with its use for drinking without treatment. In keeping with this policy, all ground water shall be restored, to the extent possible, to a quality consistent with Class GA (See Table I). However, restoration of ground water to Class GA shall not be sought when: A) The ground water is in a zone of influence of a permitted discharge; B) The ground water is designated as Class GB; unless there is demonstrated need to restore ground water to a Class GA designation or where it can be demonstrated to the Commissioner that restoration to Class GA can be reasonably achieved; C) The ground water is designated Class GC."

With this policy and the integrated ground and surface water management approach adopted, the next steps are implementation and maintenance. In our case this involved classification of all of the State's ground water into one of the four use classes established (with, in some cases, the projected class to which we will attempt to reclassify a given area also indicated; i.e., GB/GA or GB/GAA). This classification effort required detailed analysis of the natural resource data, water supply and waste disposal practices data, and land use information and application of the policy statements. Finally extensive public workshops, meetings, and

TABLE I.

GROUND WATER CLASSIFICATIONS, USES, DISCHARGES ALLOWED

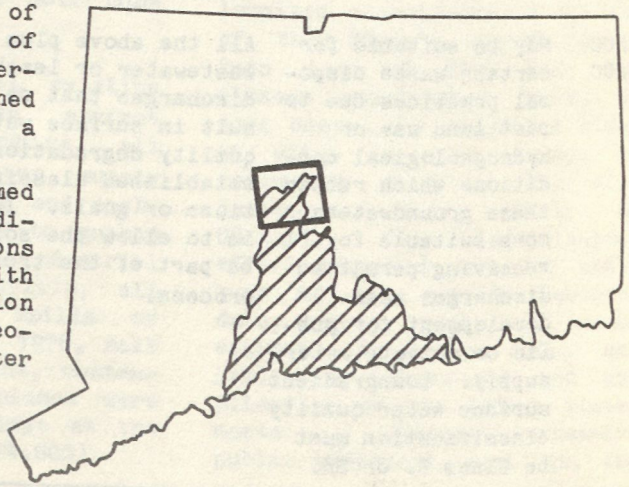
CLASS	RESOURCE USE	ACCEPTABLE DISCHARGES	PERCENTAGE OF STATE THUS CLASSIFIED	NOTES
GAA	Public and private drinking water supplies without treatment	Restricted to wastewaters of human or animal origin and other minor cooling and clean water discharges	22.0%	Encompasses all land protected as public water supply. DEP's first priority is cleaning up waste discharges located within these areas.
GA	Private drinking water supplies without treatment	Restricted to wastewaters of predominately human, animal, or natural origin which pose no threat to untreated drinking water supplies.	69.7%	No known degradation. Overall goal of State's policy is that all ground water shall be restored to extent possible to quality of at least GA.
GB/GAA GB/GA	See above	See above	2.0%	Areas that deserve the most immediate attention . . . generally areas with water supply wells but where discharges have caused or may cause contamination . . . need to be cleaned up to upgrade to GA or GAA.
GB	May not be suitable for potable use unless treated because of existing or past land uses.	All the above plus it may be suitable for receiving certain treated industrial wastewaters when the soils are an integral part of the treatment system. The intent is to allow the soil to be part of the treatment system for easily biodegradable organics and also function as a filtration process for inert solids. Such discharges shall not cause degradation of groundwaters that could preclude future use for drinking without treatment.	4.0%	Known or presumed degradation and no health related reason for cleaning up; for example, area is served by a public water supply system or land is under urban area and it is unlikely public water supply wells would ever be developed.
GA/GC GB/GC	May be suitable for certain waste disposal practices due to past land use or hydrogeological conditions which render these groundwaters more suitable for receiving permitted discharges than development for public or private water supply. Downgradient surface water quality classification must be Class B. or SB.	All the above plus other wastewater or leachate. discharges that do not result in surface water quality degradation below established classifications or goals. Intent is to allow the soil to be part of the treatment process.	0.3%	The very small area classed as GC means resource conditions will not allow continued reliance on land disposal techniques for our waste stream, and resource recovery alternatives must be developed.



MAP SHOWING WATER QUALITY CLASSIFICATIONS FOR SURFACE AND GROUND WATERS IN HEADWATER AREA OF QUINNIPIAC RIVER REGIONAL BASIN (BRISTOL, PLAINVILLE, SOUTHINGTON)

Heavy broken line shows major basin boundary of Central Coastal Basin. Section at middle right edge of basin, designated GAA (and AA for surface water reservoir), represents a public water supply watershed area. GAA within circle, lower right, represents a public water supply well.

Large unlabeled sections are known or presumed clean ground water areas (GA). Fine solid lines indicate ground water classification boundaries. Sections at center left labeled GB show ground water areas with known or presumed ground water contamination. Section above left, labeled GB/GC, is an area with hydrogeologic potential for receipt of treated wastewater discharges.



hearings were scheduled and are presently being conducted.

Standards of use rather than standards of tested quality were chosen for a variety of reasons including: flexibility to react to changing drinking water standards and new types of pollutants and the ability to prohibit in selected areas certain discharge and land use practices. Standards of use also make enforcement easier and simplify monitoring. We expect they will also encourage consideration in local zoning and aquifer protection programs and make it possible to maintain State and municipal consistency with statutory goals.

Nevertheless, one obstacle we face is the inability of the State to verify, by sufficient ground water quality monitoring, that certain quality goals exist or will be achieved. Ground water monitoring needs in Connecticut are, as a result, being re-evaluated. As in other states, considerable data is now being collected by various agencies for varying reasons. A major problem is the coordination and evaluation of this information, with improved ground water data management a major State objective.

Implementing the standards

The discharge of wastewater from industry, municipalities, homes, landfills, lagoons, and possibly hazardous waste storage and disposal facilities are legitimate uses and, therefore, must be provided for in both surface and ground waters. We recognize this critical but controversial conflict between water uses, and we identified and mapped areas most suited for such uses as well as those areas best suited for water supply development.

Our policies and standards set use requirements or limits, but they do not control actual discharges. Individual discharges are carefully controlled by our State permit and enforcement program. Permit issuance will be, however, controlled by the standards and no discharges inconsistent with a standard will be allowed. No permit may be issued which alters existing ground or surface water use or potential use without full control of the discharge and the zone of influence.

A very significant new policy relates to such plumes or zones of influence of permittted discharges. Connecticut law prohibits the permitting of pollution but allows the permitting of treatment systems designed to prevent pollution. Any discharge to the ground water, including septic systems, will alter the quality. A policy has been developed to define the zone of influence boundaries and to require control of the land area over this zone. The projected zone or plume is permitted in whole as a treatment system, and the permittee must own or have easement to the land in order to operate and maintain the treatment system. This simple policy meets the law, protects other water uses or water rights, assures long-term control over pollution sources — especially landfills, lagoons, and hazardous waste facilities — and simplifies monitoring.

The ground water standards do not specify actual value limits for chemical constituents but rely on drinking water standards to define that quality suitable for drinking without treatment. Thus the standards and policies will not have to be revised every time a new limit for a pollutant is determined. Permits for treatment systems would have to be revised to reflect such changes if necessary.

The water quality standard adoption process allows for revision on a case-by-case basis through a public hearing process. If a discharge is proposed to ground waters classified as not suitable for receiving that waste water discharge, the applicant will be required to go through the process of revising the standard on the basis of social, economic, and environmental issues before a permit application could be considered.

With our knowledge of the resource and the demands on it in place, another objective became the development of the appropriate governmental or regulatory processes necessary to manage the resources to attain the stated goal. A variety of approaches are available, ranging from specific statewide regulations to voluntary local land use planning.

Integrating the ground and surface water programs required redirection of our water quality management program. The impact of the new standards included changing the Water Compliance Unit's approach to controlling pollution. We can no longer deal on a statewide basis with general types or categories of pollution sources which primarily affect surface water. The unit now must deal with priority pollution problems that affect either ground or surface water. Greater emphasis on water quality planning and coordination with water supply planning is necessary.

In 1980 we threw away our federally required water quality plan, because it was primarily an inventory of surface water discharges, not a plan. Now our plans will deal with every conflict within a basin in terms of the standards . . . with plans for how to fix the problems, such as removing a landfill or changing the land use or zoning or changing storm water control or agricultural practices.

We found tremendous conflicts we never knew existed, landfills within public water supply watershed areas for example, or, in one town, a public water supply well that's located within the town landfill. For the first time now we have an integrated surface and ground water quality management program with specific goals and objectives. Comprehensive planning will guide or

To page 23

Largemouth bass

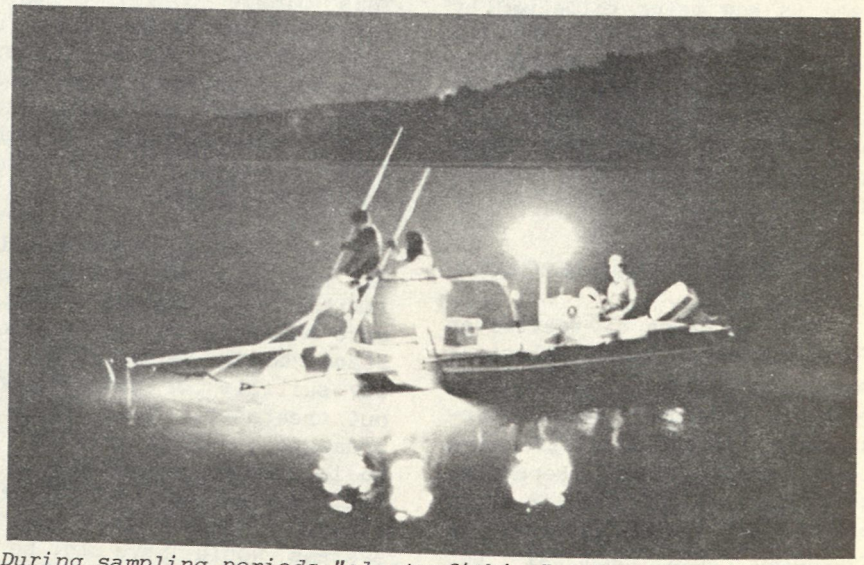
Study assesses the size, the limits

By Julie Eckhardt, Student Intern, Trinity College

In an angler survey taken in 1975, 47 percent of Connecticut's anglers reported that they preferred to fish for bass. Bass, both largemouth and smallmouth, rank a close second to trout in fishing popularity in Connecticut waters. While some anglers fish for the much desired trophy bass, others are happy to feel the tug of any bass at the end of the line.

Several years ago, however, Connecticut anglers began complaining that the bass they were catching were smaller. This suggested the possibility that there was overfishing for bass in some lakes. In addition, existing bass limits, which have been in force since 1953, have never been fully evaluated for their effect on bass populations.

During 1980, therefore, the DEP's Fisheries Bureau began a statewide stock assessment on largemouth bass. The study will evaluate the existing regulations (i.e., the 12 inch length limit and the six fish per day creel limit) as well as various alternative regulations, and its ultimate product will be a statewide largemouth bass management plan. The study is funded in part by the U.S. Fish and Wildlife Service through the Aid to Sport Fish Restoration (Dingell-Johnson) Act.



Robert Jacobs photos

During sampling periods "electrofishing" takes place between dusk and 3 a.m..

Initially eight lakes (Candlewood Lake, East Twin Lake, Lake Lillinonah, Moodus Reservoir, Pachaug Pond, Pickerel Lake, Deep River Reservoir, and Lake Konomuc) were selected for sampling, according to fisheries biologist Ernest Beckwith. Deep River Reservoir and Lake Konomuc,

which are closed to fishing, are being used as controls to determine the natural mortality rate for bass. However, because lures have been found in these reservoirs, it is apparent that they have in fact been fished and true natural mortality rates cannot be determined. Because of this, says project leader Beckwith, the original plan for determining the natural mortality rate may be dropped. The project would then depend upon published literature for natural mortality rates for bass.

During spring sampling periods, fisheries biologists go "electrofishing" at shallow depths in the selected lakes between dusk and three in the morning. Their 17-foot aluminum electrofishing boat is equipped with eight anodes (six foot, one-quarter inch diameter stainless steel cables) mounted from a boom extending six feet beyond the boat's bow. The boat hull acts as a cathode. Bass are attracted to the current emitted from the anodes and are stunned. Two netters scoop up the bass and place them in an on-board live well equipped with a recirculating pump. Fish are held for approximately one hour before being processed on board. The length and weight of each bass is recorded, and eight to 12 scales are removed for subsequent analyses of age and growth rates.

Scales are read later using a microprojector. Annual growth rings (annuli) are counted and scale measurements taken. This information is used to develop lake-specific age structures from which mortality can be estimated and growth rates can be determined.

Bass grow at different rates in each lake. Results of 1980's measurements showed bass reached the minimum legal length of 12 inches in Lake Lillinonah late in their second year, during their third year in Moodus Reservoir, and after their fourth year in Candlewood and East Twin Lakes. Most likely this is due to forage availability.

Project team member measures a bass.

Before the bass are released, the left pelvic fin of each is completely clipped off. This causes no harm to the fish. Partial clips are also made on either the dorsal or caudal fins to indicate the year in which the fish was examined. The fish are then released unharmed.

It is generally believed that female bass outlive male bass. To determine whether sexually dimorphic growth and mortality occur in Connecticut, a subsample of about 200 bass from Candlewood Lake, Lake Lillinonah, and Pachaug Pond, all larger than 250 millimeters or 10 inches long, have been taken and sexed each year. The growth and mortality rates for each sex are then calculated. If these results show significant differences by sex, it will be necessary to differentiate by sex the growth and mortality estimates used in computerized yield models.

Good estimates of growth patterns and the fishing, natural, and total mortality rates of the bass population should be available at the conclusion of the five-year project. All data gathered will be entered into mathematical yield models, which are used to test the effects various length limits and creel limits would have on bass populations.

As Beckwith sees it, this project will lead to a better understanding of Connecticut's bass population and, he hopes, to the formation of effective management policies. However, the bass, as a predator, is also an integral member of any lake's food chain. If the bass population is altered, the complete food chain may be affected. The effects given bass populations have on the food chain may lead to further research that will also need to be included in future management policies. ■

coastal area management
71 capitol avenue hartford conn 06106

By Diane Giampa,
Public Participation Coordinator

CAM NEWS

Restoring our salt marshes

In colonial days, Connecticut contained roughly 30,000 acres of tidal marshes, but by 1965 about 50 percent of them had been destroyed or had degenerated seriously. Connecticut residents themselves were often the culprits. When they weren't filling in wetlands in order to build on them or drive away mosquitos, they were erecting dams, dikes, and culverts to protect themselves from flood damage. Flood protection came at a high price, however; these structures restricted the circulation of water in the marshes and changed the nature of the plants and animals that live there.

Salt marshes act as a buffer between land and sea, since a wave breaking over a marsh loses much of its potentially destructive energy before it reaches the land. A healthy marsh provides food and shelter for animals such as herons, geese, and ducks, and about 70 percent of our commercial catch of fish, shrimp, crabs, lobsters, and mollusks spend at least parts of their lives within the marsh system. Some species spawn there; others live in the marsh where they are protected as they mature.

Marsh systems that receive regular tidal flushings can be incredibly productive. Organic matter such as marsh grasses, algae, and phytoplankton may be produced in quantities approaching 10 tons per acre each year. (A typical farm crop on land averages between three and five tons per acre a year.) Whatever is not eaten by marsh animals is washed into tidal estuaries where it will nourish large numbers of marine organisms.

The animals that live in a healthy marsh have adapted to its environment. One of the most intriguing examples of this is the behavior of the salt-marsh snail. Unlike other snails of the marsh, it must breathe air. In order to survive, it has developed the ability to sense when the tide is about to come in. Twice a day, shortly before the sea level begins to rise in the marsh, all of the salt-marsh snails begin to climb up the stems of the Spartina, or salt-water cord grasses. As the tide rises, the snail climbs higher and higher, If the water should cover the stem of the cord grass, the snail can usually remain under water long enough for the tide to ebb.

Spartina grasses are crucial to the marsh in other, even more important ways. Salt-water and salt-meadow cord grasses are the source of nearly all the necessary nutrients as well as providing protection for marsh-dwellers, and their underground stems provide support for the marsh itself. When tidal circulation is restricted by a dam or a dike, however, less and less sea water is able to enter the marsh. The salinity of the water gets lower, and eventually the marsh approaches a fresh water condition. As this happens, the Spartina grasses are slowly replaced by growths of the tall Phragmites reed, a woody (and quite hardy) grass that can reach a height of 15 feet. This species of marsh grass doesn't decompose as readily and so is not as nourishing as other marsh grasses. Phragmites also dries out, and the brittle thatch becomes a chronic fire hazard.

The Phragmites reeds (in the foreground) are a threat to a healthy saltmarsh.

Until recently, people who lived near salt marshes that happened to be located in flood-prone areas were often confronted with equally unattractive alternatives. If they didn't build dikes and culverts, they would face the near certainty of flood damage in a severe storm. But if they did build structures to inhibit

To page 23

Hartford fern

What is so rare...

Plants that need your protection

By Leslie J. Mehrhoff,
Senior Environmental Analyst,
DEP Natural Resources Center

There appeared in the "New York Tribune" of May 5, 1901, the following unsigned notice: "Now that spring is really here, the picnicking parties are invading the woods north of the Harlem, and have begun the annual systematic destruction of a large proportion of all wild flowers within reach. The authorities of the Botanical Garden are on the lookout for them, and within their own precincts will guard the blossoms as thoroughly as possible under a well-planned system; but the rest of the Bronx will be at their mercy, and that means death to many a poor little plant. It is not that these ruthless explorers fail to appreciate the beauty of flowers — They 'just love them' in all probability . . .."

Conservation of our native wildflowers is not a new issue as this quotation, which appeared in a 1917 article by Mrs. Nathaniel Lord Britton (wife of the senior author of the new Britton & Brown illustrated flora, which we still use to this day) in the "Journal of the American Museum of Natural History," shows. In 1902 the Society for the Protection of Native Plants was organized in Boston. Plant conservation concerns were running high in our country. Chapters of the Wildflower Preservation Society of America were established in Washington, Baltimore, Philadelphia, Chicago, Cincinnati, and Milwaukee (Britton, 1917).

In our own State there was an early concern for rare plants. According to Daniel Cady Eaton, in "Ferns of the United States of America and British North American Possessions," a law was passed in 1869 to protect the Hartford or climbing fern, Lygodium palmatum (Bernh.) Sw. (Eaton, 1879, p.5):

> The carefully pressed fronds are much used as an article of parlor ornament or decoration in the cities of Connecticut, and the custom is

Illustrations: Caryn Alleva

spreading to other States. The plant is gathered in August and September, and is exposed for sale in Hartford, New Haven, and New York, in great quantitites, both in the fresh condition and as pressed specimens. Indeed, the gathering of it became so destructive, that in 1869 the legislature of Connecticut passed a special law for its protection. This law has since been codified in the revision of the statutes of 1875; and under title XX, chapter iv, section 22, it is made an offense, punishable by a fine not exceeding one hundred dollars, or imprisonment not more than twelve months, or both, to wilfully cut, destroy, or take away from the land of another person any 'cranberries, creeping-fern, crops, shrub, fruit, or vegetable production.' (Eaton's italics)

This is probably the only instance in statute law where a plant has received special legal protection solely on account of its beauty.

Unfortunately no current law protects rare plants in Connecticut although we hope there will be one in the not too distant future. In 1976 the Connecticut Geological and Natural History Survey published the "Rare and Endangered Species of Connecticut and Their Habitats" by J.J. Dowhan and R.J. Craig (Report of Investigation #6). This listed 275 taxa (plural for species, subspecies, or varieties; taxon is singular) as endangered, threatened, rare, or declining or of indeterminable status in our state.

In 1978 the New England Botanical Club in cooperation with the U.S. Fish and Wildlife Service released reports on all six New England States. The report for Connecticut (Mehrhoff, 1978) listed 282 taxa (16 deleted, 23 added). Since then the New England Botanical Club's Endangered Species Committee has issued a combined report for New England (Crow, 1981) in which those species which are rare in some states but common in others have been dropped. Recently, this committee prepared a book which covers 101 of New England's rarest plants, with illustrations and dot maps (Crow 1982).

In Connecticut the Connecticut Geologic and Natural History Survey of the DEP's Natural Resources Center has continued its work on rare and endangered plants. Our knowledge of the State's rare species has expanded through museum and field work. The Survey will eventually produce a book on the rare plants, which will be of value to both the general public and the scientific and conservation communities. And it will be illustrated!

In the interim, the new Preservation List that follows, which was prepared by the Rare Plant Program in cooperation with the Federated Garden Clubs of Connecticut, serves a valuable purpose in addition to its primary use. Attention will be drawn to our rare plants. The list is very similar to our State list of rare species. More important, this new list has seven years of endangered species work upon which to draw, unlike the earlier lists which predate the Survey's work.

There are many new names on this list, many of them unfamiliar. These are the little known species which are rare and deserving of our protection. Some old favorites, like mountain laurel, are gone, this list being based on facts and not favoritism.

The Garden Clubs use this list of plants that may not be used in competition in order to protect some of our rare flora. Some species, which are not rare, have been placed on the list because they are so attractive and popular and additional collecting pressure could be detrimental. This list will help to protect these plants, both among garden club members and outside the clubs, by calling attention to them and to their need for protection.

The Garden Clubs will use the list not only to protect the plants but also to educate members and non-members alike about plants and their conservation. This way, unlike those lovers of flowers about which Mrs. Britton wrote over 60 years ago, people can 'just love them' in a much better sense.

The habitat notations in the right hand column, are, for obvious reasons, arbitrary. Species are usually found in the broad habitats as listed but may occur in others. The notations are as follows:

W Woodlands
O Open areas (fields, meadows)
B Bogs, swamps, wetlands
S Special areas (limestone ledges, sea/coast etc.)

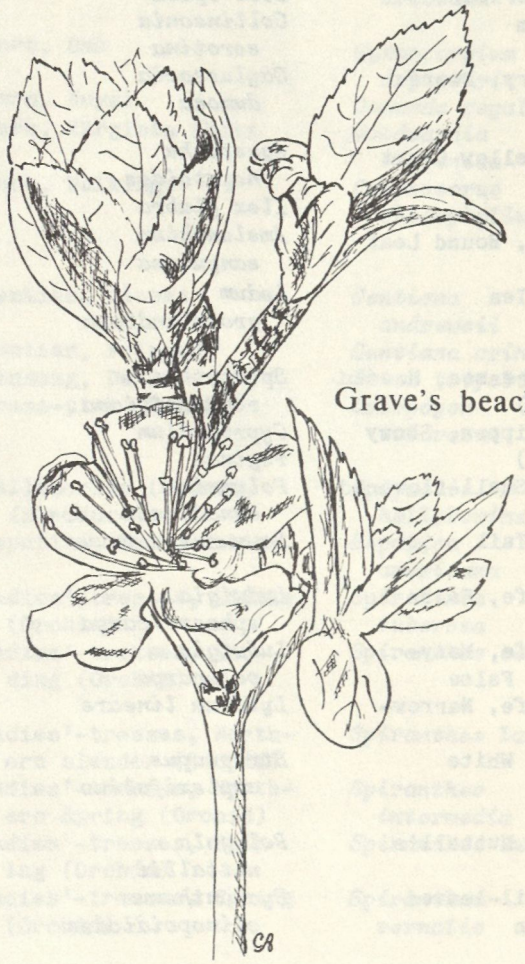
If you know the location of any species included in List I please contact:

Rare Plant Program
Connecticut Geological &
Natural History Survey
State Office Building Room 555
165 Capitol Avenue
Hartford, CT 06106
Phone (203) 566-3540

I.
RARE AND/OR ENDANGERED. DO NOT PICK!

Adder's mouth, green (Orchid)	*Malaxis unifolia*	W
Adder's mouth, white (Orchid)	*Malaxis monophyllos*	W
Angelica, Sea-coast	*Coelopleurum lucidum*	S
Arethusa (Orchid)	*Arethusa bulbosa*	B
Aster, Bernhardi's	*Aster glomeratus*	W
Aster, Bog	*Aster nemoralis*	B
Aster, Crooked-stemmed	*Aster prenanthoides*	W
Aster, Showy	*Aster spectabilis*	W

Aster, Sickle-leaved Golden	*Chrysopsis falcata*	S
Aster, Upland White	*Aster ptarmicoides*	S
Beggar's-tick	*Bidens heterodoxa*	B
Beggar's-tick, Eaton's	*Bidens eatonii*	B
Bellflower, Marsh Blue	*Campanula uliginosa*	B
Bellwort, Large-flowered	*Uvularia grandiflora*	W
Blueberry, Velvet-leaved	*Vaccinium myrtilloides*	W
Bluets, Long-leaved	*Houstonia longifolia*	W
Bunchflower, Crisped	*Melanthium hybridum*	W
Chaffseed	*Schwalbea americana*	O
Cinquefoil, Three-toothed	*Potentilla tridentata*	W
Clammy Weed	*Polanisia dodecandra*	W
Coltsfoot, Palmate-leaved Sweet	*Petasites palmatus*	W
Comfrey, Southern Wild	*Cynoglossum virginianum*	W
Coral-root, Autumn (Orchid)	*Corallorhiza odontorhiza*	W
Coral-root, Early (Orchid)	*Corallorhiza trifida*	B
Corn-salad	*Valerianella radiata*	O
Fern, Hairy Lip	*Cheilanthes lanosa*	S
Fern, Hartford or Climbing Fern	*Lygodium palmatum*	W
Gentian, Narrow-leaved Horse	*Triosteum augustifolium*	W
Gentian, Stiff	*Gentiana quinquefolia*	W
Geranium, Northern	*Geranium bicknellii*	W
Gerardia, Acute-leaved	*Agalinis acuta*	O
Germander, Northern	*Teucrium occidentale*	W
Ginseng, American	*Panax quinquefolius*	W
Globe-flower, Spreading	*Trollius laxus*	B
Golden Club	*Orontium aquaticum*	B
Golden Alexanders, Heart-leaved	*Zizia aptera*	W
Goldenseal	*Hydrastis canadensis*	W
Green Dragon	*Arisaema dracontium*	W
Harlequin, Yellow	*Corydalis flavula*	S
Heather, Beach	*Hudsonia tomentosa*	S
Heather, Golden	*Hudsonia ericoides*	S



Grave's beach plum

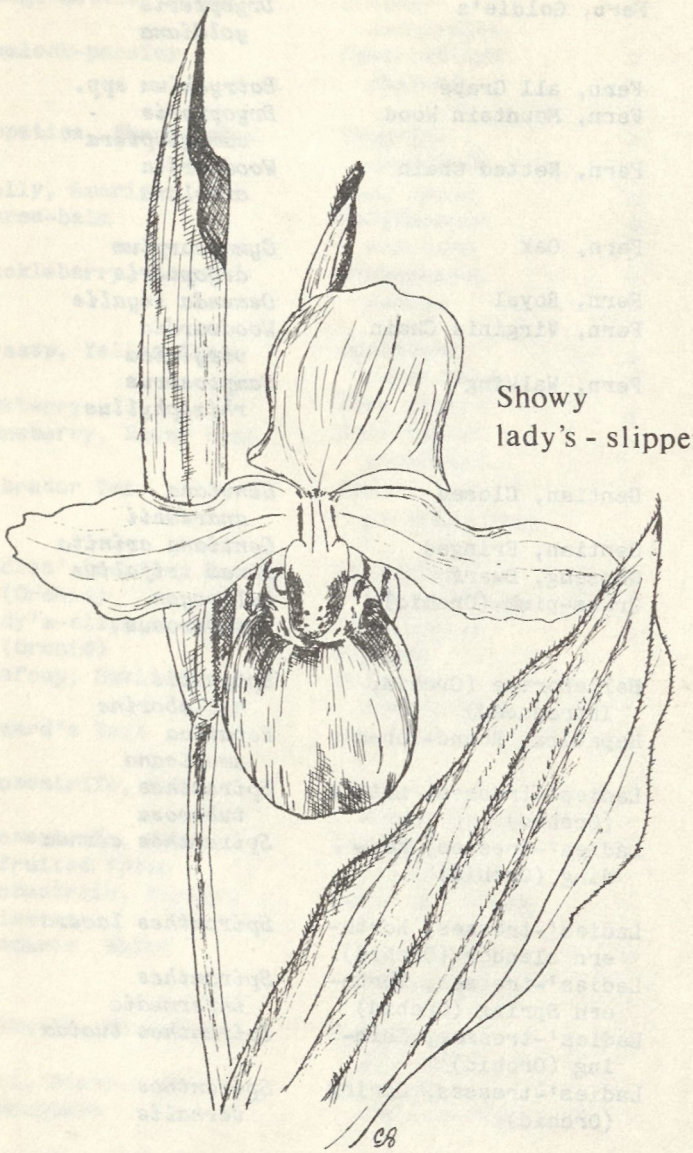
Hedge-nettle, Hyssop	*Stachys hyssopifolia*	W
Hedge-nettle, Rough	*Stachys tenuifolia*	W
Hemlock-parsley	*Conioselinum chinense*	W
Hepatica, Sharp-lobed	*Hepatica acutiloba*	W
Holly, American	*Ilex opaca*	W
Horse-balm	*Collinsonia serotina*	W
Huckleberry, Dwarf	*Gaylussacia dumosa*	B
Hyssop, Yellow Giant	*Agastache nepetoides*	W
Inkberry	*Ilex glabra*	W
Juneberry, Round Leaf	*Amelanchier sanguinea*	S
Labrador Tea	*Ledum groenlandicum*	B
Ladies'-tresses, Hooded (Orchid)	*Spiranthes romanzoffiana*	B
Lady's-slipper, Showy (Orchid)	*Cypripedium reginae*	B
Leafcup, Small-flowered	*Polymnia canadensis*	W
Lizard's Tail	*Saururus cernuus*	O
Loosestrife, False	*Ludwigia sphaero-carpa*	B
Loosestrife, Many-fruited False	*Ludwigia polycarpa*	B
Loosestrife, Narrow-leaved	*Lythrum lineare*	S
Mandarin, White	*Streptopus amplexifolius*	W
Milkwort, Nuttall's	*Polygala nuttallii*	W
Mint, Basil-leaved Mountain	*Pycnanthemum clinopoidiodes*	W
Mint, Torrey's Mountain	*Pycnanthemum torrei*	W
Orchid, Round-leaved	*Platanthera orbiculata*	W
Orchid, Tall White Bog	*Platanthera dilatata*	B
Orchid, White Fringed	*Platanthera blephariglottis*	B
Orchid, Yellow Fringed	*Platanthera ciliaris*	O
Pimpernel, Yellow	*Taenidia integerrima*	W
Pink, Large Marsh	*Sabatia dodecandra*	S
Pink, Sea	*Sabatia stellaris*	S
Plum, Alleghany	*Prunus alleghaniensis*	W
Plum, Grave's Beach	*Prunus maritima var. gravesii*	S
Pogonia, Nodding (Orchid)	*Triphora trianthophora*	W
Pogonia, Small Whorled (Orchid)	*Isotria medeoloides*	W
Putty-root (Orchid)	*Aplectrum hyemale*	B
Rattlesnake-Plantain, Dwarf (Orchid)	*Goodyera repens*	W
Redroot	*Lachnanthes caroliana*	B
Rhodora	*Rhododendron canadense*	B
Rhododendron, Great	*Rhododendron maximum*	W
Rockbrake, Slender (Fern)	*Cryptogramma stelleri*	S
Rockrose, Bushy	*Helianthemum dumosum*	O
Rockrose, Low	*Helianthemum propinquum*	O
Rosemary, Bog-	*Andromeda glaucophylla*	B
St. Johnswort, Creeping	*Hypericum adpressum*	B
St. Johnswort, Giant	*Hypericum pyramidatum*	B
Sandwort, Large-leaved	*Arenaria macrophylla*	S
Sandwort, Mountain	*Arenaria glabra*	S
Snakeroot, Seneca	*Polygala senega*	W
Snakeroot, Small White	*Eupatorium aromaticum*	W
Snakeroot, Virginia	*Aristolochia serpentaria*	W
Solomon's Seal, Bog False	*Smilicina trifolia*	B
Skullcap, Small	*Scutellaria parvula*	B
Spleenwort, Narrow-leaved	*Diplazium pycnocarpon*	W
Spleenwort, Mountain (Fern)	*Asplenium montanum*	W
Spleenwort, Wall-rue (Fern)	*Asplenium ruta-muraria*	S
Spruce, Black	*Picea mariana*	B
Squirrel Corn	*Dicentra canadensis*	W
Stagger-bush	*Lyonia mariana*	W
Strawberry, Barren	*Waldsteinia fragarioides*	W
Sundew, Thread-leaved	*Drosera filiformis*	S
Sundrops	*Oenothera fruticosa*	O
Sunflower, Tall tick-seed	*Bidens coronata*	O
Twin Flower	*Linnaea borealis*	W
Violet, Canada	*Viola canadensis*	W
Violet, Coast	*Viola brittoniana*	W

Violet, Cream	*Viola striata*	W
Violet, False	*Dalibarda repens*	W
Violet, Great-spurred	*Viola selkirkii*	W
Violet, kidney-leaved	*Viola renifolia*	W
Violet, Southern Wood	*Viola hirsutula*	W
Violet, Northern Bog	*Viola nephrophylla*	W
Waterleaf, Virgina	*Hydrophyllum virginianum*	W
Waterlily	*Nymphaea tuberosa*	B
Wintergreen, One-flowered	*Moneses uniflora*	W
Wood-mint, Hairy	*Blephilia hirsuta*	W

II

NOT RARE IN STATE BUT IN DANGER OF DECLINING AND SHOULD NOT BE PICKED

Adder's tongue (Fern)	*Ophioglossum Vulgatum*	O
Alleghany Vine	*Adlumia fungosa*	W
Azalea, Early	*Rhododendron roseum*	W
Azalea, Pink	*Rhododendron nudiflorum*	W
Azalea, Swamp	*Rhododendron viscosum*	W
Beach Plum	*Prunus maritima*	S
Bearberry	*Arctostaphylos uva-ursi*	W
Bluebell	*Campanula rotundifolia*	W
Bunchberry	*Cornus canadensis*	W
Calla, Wild	*Calla palustris*	B
Cardinal Flower	*Lobelia cardinalis*	B
Carolina Spring-beauty	*Claytonia caroliniana*	W
Catchfly, Pink	*Silene caroliniana*	O
Clematis, Purple	*Clematis verticillaris*	W
Cliffbrake, Purple (Fern)	*Pellaea atropurpurea*	S
Clubmosses, Running Pine or Ground Pine Ground Cedar	*Lycopodium spp.*	W
Coral-root, Spotted (Orchid)	*Corallorhiza maculata*	W
Dogwood, Flowering	*Cornus florida*	W
Dutchman's Breeches	*Dicentra cucullaria*	W
Fern, Boott's	*Dryopteris boottii*	W
Fern, Broad Wood	*Dryopteris X triploidea*	W
Fern, Bulblet Bladder	*Cystopteris bulbifera*	W
Fern, Clinton's	*Dryopteris clintoniana*	W
Fern, Crested Wood	*Dryopteris cristata*	W
Fern, Goldie's	*Dryopteris goldiana*	W
Fern, all Grape	*Botrychium spp.*	W
Fern, Mountain Wood	*Dryopteris campyloptera*	W
Fern, Netted Chain	*Woodwardia areolata*	B
Fern, Oak	*Gymnocarpium dryopteris*	W
Fern, Royal	*Osmunda regalis*	B
Fern, Virginia Chain	*Woodwardia virginica*	B
Fern, Walking	*Camptosorus rhizophyllus*	S
Gentian, Closed	*Gentiana andrewsii*	O
Gentian, Fringed	*Gentiana crinita*	O
Ginseng, Dwarf	*Panax trifolius*	W
Grass-pink (Orchid)	*Calopogon tuberosus*	B
Helleborine (Orchid, Introduced)	*Epipactis helleborine*	W
Hepatica, Round-lobed	*Hepatica americana*	W
Ladies'-tresses, Little (Orchid)	*Spiranthes tuberosa*	O
Ladies'-tresses, Nodding (Orchid)	*Spiranthes cernua*	O
Ladies'-tresses, Northern slender (Orchid)	*Spiranthes lacera*	O
Ladies'-tresses, Northern Spring (Orchid)	*Spiranthes intermedia*	O
Ladies'-tresses, Shining (Orchid)	*Spiranthes lucida*	O
Ladies'-tresses, Spring (Orchid)	*Spiranthes vernalis*	O
Ladies'-tresses, Yellow Nodding (Orchid)	*Spiranthes ochroleuca*	O
Laurel, Bog	*Kalmia polifolia*	B
Lily, Bluebead	*Clintonia borealis*	W
Lily, Canada	*Lilium canadense*	W
Lily, Turk's Cap	*Lilium superbum*	W
Lily, Wood	*Lilium philadelphicum*	W
Lobelia, Blue	*Lobelia siphilitica*	W
Lobelia, Brook	*Lobelia kalmii*	B
Lopseed	*Phryma leptostachya*	W
Lupine, Wild	*Lupinus perennis*	O
Maidenhair Spleenwort (Fern)	*Asplenium trichomanes*	W
Lady's-slipper, Pink (Orchid)	*Cypripedium acaule*	W



Showy
lady's - slipper

Lady's-slipper, Yellow (Orchid)	*Cypripedium calceolus*	W
Mandarin, Rose	*Streptopus roseus*	W
Orchid, Hooker's	*Platanthera hookeri*	W
Orchid, Large Purple Fringed	*Platanthera grandiflora*	B
Orchid, Long-bracted Green	*Coeloglossum viride*	W
Orchid, Pale Green (Orchid)	*Platanthera flava*	W
Orchid, Ragged Fringed	*Platanthera lacera*	W
Orchid, Showy	*Galearis spectabilis*	W
Orchid, Small Green Woodland	*Platanthera clavellata*	W
Orchid, Small Purple Fringed	*Platanthera psycodes*	B
Orchid, Tall Northern Green	*Platanthera hyperborea*	W
Pipsissewa	*Chimaphila umbellata*	W
Pitcher-plant	*Sarracenia purpurea*	B
Pogonia, Large Whorled (Orchid)	*Isotria verticillata*	W
Pogonia, Rose (Orchid)	*Pogonia ophioglossoides*	B
Polygala, Fringed	*Polygala paucifolia*	W
Prickly Pear, Eastern	*Opuntia compressa*	S
Rattlesnake-plantain, Checkered (Orchid)	*Goodyera tesselata*	W
Rattlesnake-plantain, Downy (Orchid)	*Goodyera pupbescens*	W
Sea Lavender	*Limonium nashii*	S
Shamrock, Water (Introduced fern)	*Marsilea quadrifolia*	B
Shinleaves	*Pyrola spp.*	W
Snowberry, Creeping	*Gaultheria hispidula*	B
Sundew, Narrow-leaved	*Drosera intermedia*	B
Sundew, Round-leaved	*Drosera rotundifolia*	B
Trailing Arbutus	*Epigea repens*	W
Trillium, Nodding	*Trillium cernuum*	W
Trillium, Painted	*Trillium undulatum*	W
Twayblade, Bog (Orchid)	*Liparis loeselii*	B
Twayblade, Lily-leaved (Orchid)	*Liparis lilifolia*	W
Violet, Downy Yellow	*Viola pubescens*	W
Virginia Spring-beauty	*Claytonia virginiana*	W
Wintergreen, Spotted	*Chimaphila maculata*	W
Woodsia, Rusty (Fern)	*Woodsia ilvensis*	W

Collections

From page 5

used for education and research. Grandfather's hobby can be an important tool for protecting our natural heritage by educating those that use the museum's facilities, either for research or exhibits. If you have one of these collections, be it old or new, large or small, why not see your "Cabinet of Curiosities" protected. Please contact me at:

The Connecticut Geological
and Natural History Survey
The University of Connecticut
U-42
Storrs, Connecticut 06268
486-3266 or 566-3540 ■

Ground water

From page 13

efforts to prevent or resolve water pollution problems. We will know which problems we need to address as priorities. The new plans will allow us to make decisions intelligently and to incorporate greater public input.

The Standards and Classifications affect all of the programs and most of the policy issues that this agency deals with. Admittedly, the implications may turn out to go well beyond what is presently envisioned. No doubt they will raise a lot of questions where political factors, such as town lines, and hydrological factors conflict.

With a comprehensive plan in place we recognized that several important legal authorities were missing from our array of laws, and legislative action was called for. Control over ground and surface water withdrawal and allocation was needed, and this was obtained through a diversion bill passed 1982. Authority to ban certain septic tank cleaning agents and regulate underground fuel and chemical storage were also lacking, and this legislation was also passed in 1982. Authority to correct ground water pollution problems existed, but the authority to require that potable water be supplied to those persons whose wells were contaminated was needed because, in most cases, cleanup of ground water is not feasible in any timely fashion. This legislation was also passed in 1982.

At this stage in our program it becomes extremely important to evaluate local land use and water quality programs and controls and to maximize public involvement in ground water management program development. Any ground water management approach should include the review of, and possibly modifications to, local land use programs. If local officials, water utilities, the scientific community, legislators, and the affected public are not involved, not aware, or not in agreement with State goals, the program will not be successful. The most serious problem we have encountered so far has been the general public's lack of understanding of the need to identify areas potentially suited for waste disposal (i.e., Class GC).

One last facet of our ground water program I should discuss is paying for it. Development costs in Connecticut have reached about a million dollars and it has involved roughly 22 work years since 1979. Costs of data maintenance alone are projected at two work years annually. ■

Salt marshes

From page 16

tidal flushing, they would have to contend with the fire hazard of the dry Phragmites as well as with the slow destruction of the circulation-starved marsh.

Most people now realize the importance of restoring marshes to their "historic condition" — the way they were in their natural states. Tom Steinke, the Conservation Director of the Town of Fairfield, has done extensive work on the dual problems of flood control and marsh restoration and has developed a self-regulating tide gate. If flooding is not a concern, tidal flushing could be restored simply by removing the dikes and allowing nature to take its course. But in flood-prone areas, it is vital that the amount of water entering the system be regulated. Steinke's self-regulating tide gate does this through a series of floats that will allow just so much water to enter the marsh before they automatically close the gates. When the water level recedes, the pressure is lessened and the gates open to allow the water to flow out of the marsh. Several of these gates have been installed in Fairfield, and the resulting improvements in the marshes are encouraging.

The DEP's Coastal Management Program has also become involved in marsh restoration. It has funded a Connecticut College study of 15 wetland areas in the State to determine the best ways to restore degraded areas. Connecticut, unfortunately, has a long history of neglecting its wetlands; but that attitude is changing now, and we are making real progress in this area. ■

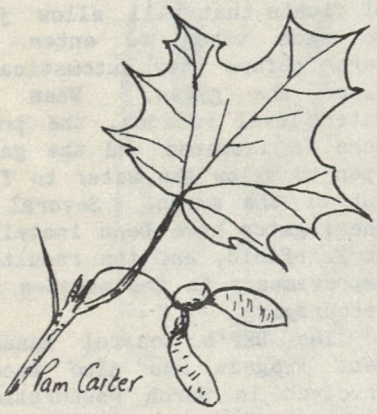
Ski CT

With holiday lift tickets elsewhere costing as much as $25, Connecticut ski prices are a welcome relief. Holiday rates generally range from $15 to $18. Woodbury Ski and Racquet Club offers perhaps the lowest holiday rates: $11 for adults, $10 for juniors. Proximity makes State ski areas perfect for day trips as well as evenings of skiing. Powder Ridge, in Middlefield, keeps its 16 slopes and trails open until 3 a.m. Friday and Saturday nights and until 10 p.m. week nights. Woodbury, Mount Southington, Ski Sundown in New Hartford, and Ohoho in Woodstock also have night skiing. All Connecticut areas have snow making; most, like Mohawk Mountain, have upgraded facilities.

The State Department of Ecoonomic Development's Travel Office has toll-free information lines that can be called any time for up-to-date Connecticut skiing conditions. In Connecticut, call 1-800-842-7492; Maine to Virginia, call 1-800-243-1685. ■

Trailside Botanizing

by G. Winston Carter



Sugar maple
(Acer saccharum)

The brilliant red, orange, and yellow leaves of the sugar, or rock, maple make this tree a standout in the autumn foliage. Few trees can come close to matching this display. This species is often found growing on hillsides in association with oak and beech. It appears to do best on rather moist sites.

Sugar maple is characterized by opposite leaf arrangement, with simple, usually five-lobed, leaves with U-shaped notches between the lobes. It has small, dangling bell-like flowers in early spring and fruit in the form of winged seeds that resemble rabbit ears. The fruit is not fully mature until fall, unlike that of red and silver maple which have similar fruits that ripen in the spring.

The wood of sugar maple has been considered valuable for many purposes since Colonial days because of its uniform texture and hardness. It is an ideal wood for flooring and bowling pins and is highly prized for furniture. Bird's eye maple and curly maple are two forms of sugar maple that occur when abnormalities in the wood give it a pattern which is very attractive and is in great demand.

Sugar maples are good shade trees if planted in a small village; however, they are unable to stand the air pollution associated with most of our cities. "Sugar bush" is another name for sugar maple, alluding to its value for the production of maple syrup and sugar. The colonists learned this process from the Indians, setting in motion some interesting social practices associated with the yearly harvest. These continue in some areas to this day although time and technology have brought many changes in this fascinating aspect of our heritage. Many forms of wildlife enjoy the seeds, twigs, buds, and bark of this valuable tree.■

DEP Citizens' Bulletin
State of Connecticut
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